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RGENCY MANAGEMENT AGENCY

Training Courses Related to Dam Safety

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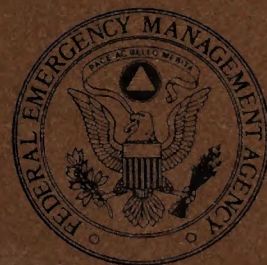
National Weather Service

Prepared By

Interagency Committee on Dam Safety (ICODS)

Subcommittee on Training

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TRAINING COURSES RELATED TO DAM SAFETY

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U.S. Army Corps of Engineers
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Tennessee Valley Authority
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Bureau of Reclamation
Denver, Colorado

FOREWORD

The information in this catalogue provides a list and abstract of government sponsored training courses that relate to dam safety. The catalogue lists, in alphabetical order, the courses available from each of the nine participating Federal agencies. These training courses have been developed by the agencies having responsibility for the design, construction and maintenance of water retention dams for whatever purpose intended. The "Interagency Committee on Dam Safety, Subcommittee on Training", has made this catalogue available to any individual, engineer, Local, State or Federal Agency Official who may have a need for increased knowledge in the various subjects available herein. Additional information as to location, dates, cost, availability and participation requirements for the courses listed should be directed to the appropriate point of contact on page i. Copies of this catalogue may be obtained from the Federal Emergency Management Agency, Washington, DC 20472.

POINTS OF CONTACT FOR EACH AGENCY'S TRAINING OFFICE

U.S. Army Corps of Engineers
Training Management Division
Training Center for Professional
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P.O. Box 1600
Huntsville, Alabama 35807
(205) 895-5032

U.S. Department of the Interior
Bureau of Land Management
Denver Service Center
Building 50, D-420
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(303) 234-2264

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Washington, D.C. 20013
(703) 235-8030

Bureau of Reclamation
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P.O. Box 25007
Denver, Colorado 80225
(303) 234-3398

U.S. Geological Survey
EROS Data Center
Sioux Falls,
South Dakota 57198
(303) 594-6114

National Weather Service
Tulsa River Forecast
Center
333 W. 4th Street
Room 3031
Tulsa, Oklahoma 74103
(918) 581-7121

Tennessee Valley Authority
ATTN: Mr. George L. Buchanan
400 West Summit Hill Drive
Knoxville, TN 37902

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BLASTING SAFETY AND TECHNIQUES (COE)

Course Length: 40 hours

PURPOSE

To provide the participants with a working knowledge of the basic requirements for inspecting projects where blasting will be performed. To relate to the participant the current safe construction blasting practices and properties to explosives.

DESCRIPTION

Covers through lecture, directed informal discussion, and case studies such topics as product categories; ingredient and properties; detonation; cause and prevention of accidents; safety, handling, and prevention of misfires and hang fires; storage and transportation safety; destroying explosives; electric and non-electric recommended use methods; instrumentation; identification and prevention of detonation hazards; "fly rock;" shot guarding and blast signals; designing and implementing a safety program; examining safety's enemies; Federal regulations; and environmental considerations. Also covers a review of current safe construction blasting practices with emphasis on techniques that obtain the best results from the point of view of the Corps of Engineers. Teaches fundamental and detailed considerations of blast design for both underground and surface employment, including optimizing results and troubleshooting problems. Presplitting, blast, and vibration control; adapting blast methods to geological conditions; the mechanics of blasting; and other related topics are included. Explosives properties that pertain to desired results and the selection of proper explosives for all types of construction are covered.

CONCRETE CONSTRUCTION INSPECTION (COE)

Course Length: 40 Hours

PURPOSE

To provide the participant with the specific knowledge required to assure the adequacy of contractor concrete operations.

DESCRIPTION

Covers, through lecture and conference sessions, concrete construction in depth including such subjects as materials, sampling, testing, handling, mixing, placing, compacting, finishing, curing, construction quality management, and other miscellaneous items.

CONCRETE ENGINEERING TECHNOLOGY (COE)

Course Length: 40 Hours

PURPOSE

To relate to the participant his/her responsibility in design construction and evaluation of structures and preparation of specifications dealing with concrete and related products.

DESCRIPTION

Covers through lecture and conference sessions, design considerations (material investigations; thermal properties, specialized techniques, grouting, shotcrete, soil cement and paving; specialized applications, slipforming, roller compacted, high strength, and precast tunnel liners); preparation of concrete materials design memorandum; construction (qualities of concrete, approval of materials, quality control, quality assurance and acceptance); evaluation and maintenance of existing structure condition survey, non-destructive testing, instrumentation, cavitation resistance fibrous concrete, new materials and recycled concrete). Time is allocated for consultation with instructors and presentation of concrete material problems by students.

CONCRETE MAINTENANCE AND REPAIR (COE)

Course Length: 40 Hours

PURPOSE

This course will provide the participant with specific knowledge of materials techniques, and procedures for repair of cracked and deteriorated concrete and for maintenance of sound concrete.

DESCRIPTION

Through lecture and demonstration sessions, this course covers the causes of distress, determining extent of failure, advantages and disadvantages of making repairs, and method of repairs with concrete, shotcrete, mortars, epoxy resins, surface coatings, and joint sealants. This course does not cover maintenance and repair of concrete pavements. These subjects are covered in another course entitled, "Maintenance and Repair of Pavements and Railroads."

CONSTRUCTION OF EARTH AND ROCKFILL DAMS FOR RESIDENT ENGINEERS (COE)

Course Length: 40 Hours

PURPOSE

To relate to resident and assistant engineers on earth and rockfill dams the nature and significance of design requirements and to explain optimum construction and construction control techniques.

DESCRIPTION

Describes, through lecture and directed discussion, the fields of soil identification, soil sampling and testing, foundation preparations, earthfill and rockfill operations and field instrumentation. All of these subjects will be placed in the proper perspective as they related to foundation, excavation, and embankment fill. Several hours will be devoted to demonstrations in the field and laboratory. A discussion by a panel of experts on earth and rockfill dams will be the concluding highlight.

CONSTRUCTION QUALITY MANAGEMENT (COE)

Course Length: 16 Hours

PURPOSE

This course is designed to educate the participant on the objective of Construction Quality Management related to establishing quality requirements, controlling quality during construction, and taking necessary measures to assure quality. This course will also provide the participant with the opportunity to discuss any problems associated with the implementation of the system of Quality Control and Assurance.

DESCRIPTION

Through lecture and guided discussion sessions, this course covers a background of the system; inclusion of quality in documents; responsibilities of the contractor and the government under this system; implementation; and enforcement. Case studies will be used to the maximum with emphasis on student participation.

DAM BREAK ANALYSIS (COE)

Course Length: 36 Hours

PURPOSE

This is intended to provide Corps hydrologic and hydraulic engineers with techniques to analyze consequences of hypothetical dam failures.

DESCRIPTION

Development of the dam failure flood wave, downstream routing of the wave, and the interactions necessary to assist local governments in developing an evacuation plan will be discussed. The emphasis will be on the hydrology/hydraulic aspects of these studies. Flood wave travel time, inundated area, velocity, and depth information will be developed in support of a case study evacuation plan. Corps "Flood Emergency Plans" guidelines and case study will be used in the workshop. The National Weather Service computer program DAMBRK will be extensively used for flood wave routing.

DRILLING AND SAMPLING FOR ENGINEERING PURPOSES (COE)

Course Length: 24 Hours

PURPOSE

This course will provide engineers, geologists, and field inspection personnel with the latest CE and industry methodology for planning, implementing, and evaluating field drilling and sampling projects. It will also enhance understanding of methods, mechanics, and products available and evaluate requirements and adequacies of various aspects of these fields. Applicable remote sensing and instrumentation procedures are outlined.

DESCRIPTION

- a. Philosophy of field exploration
- b. Planning an investigation
- c. Drilling methods and machines
- d. Effects of sample disturbance on engineering properties.
- e. Drilling muds.
- f. Effects of sample disturbance.
- g. Rock sampling procedures
- h. Soil sampling procedures.
- i. Special excavations.
- j. Vane shear/cone penetration devices.
- k. Special devices, optical and geophysical.
- l. Field permeability (pumping and pressure testing).
- m. Instrumentation.

DYNAMIC ANALYSIS FOR EARTHQUAKE ENGINEERING (COE)

Course Length: 80 Hours

PURPOSE

This course will provide a background in structural dynamics needed for a basic understanding of dynamic methods of analysis for earthquake engineering.

DESCRIPTION

- a. Vibration of a single-degree-of-freedom (SDOF) system.
 - b. Elasto-plastic analysis of an SDOF system.
 - c. Lumped mass multidegree systems.
 - d. Distributed mass system.
 - e. Response of SDOF and multidegree system to support motion.
 - f. Response spectrum analysis.
 - g. Practical considerations for design.
-

EARTHQUAKE ANALYSIS OF CONCRETE DAMS & APPURTUNANT STRUCTURES (COE)

Course Length: 40 Hours

PURPOSE

This course will provide Corps civil engineers who have had training in the fundamentals of dynamic analysis with training in the use of dynamic methods of analysis for the design and analysis of concrete hydraulic structures.

DESCRIPTION

- a. Earthquake characteristics.
- b. Seismic waves and estimation of strong motions.
- c. Seismic instrumentation and data interpretation.
- d. Selection of design earthquakes.
- e. Soil-structure interaction.
- f. Use of response spectrum and finite element methods of analysis in the seismic design of concrete hydraulic structures.
- g. Structure-foundation-reservoir interaction.
- h. Interpretation of analysis results.

EARTHQUAKE SOILS RESPONSE (COE)

Course Length: 36 Hours

PURPOSE

To teach the attendees the principles and methods currently available that are used to determine the soil response of earth structures subject to earthquake loading, and to present a summary of the empirical data base available to validate the methods of analysis.

DESCRIPTION

The course will present introductory material on principals of earthquake engineering and summarize methods currently available for analysis of soil and embankment response to earthquake loadings, including propagation of ground motions, liquefaction-related behavior of soils, and permanent deformations of embankments. Field and laboratory tests to obtain dynamic soil properties will be described. The following methods of analysis will be presented: The Newmark-Ambraseys analysis of permanent displacements. the Seed-Idriss simplified method for analysis of liquefaction, and one-dimensional (SHAKE) and two-dimensional (QUAD 4 and LUSH) computer analyses of wave propagation in embankments and foundations.

EARTHQUAKE CONSTRUCTION INSPECTION 1 (COE)

Course Length: 40 Hours

PURPOSE

To provide the participant with proper earthwork inspection techniques and to improve quality control management on construction project.

DESCRIPTION

Covers, through lecture and conference sessions, the field of soils identification, soil sampling and testing, and techniques for earthwork inspection and testing.

EARTHWORK CONSTRUCTION INSPECTION II (COE)

Course Length: 40 Hours

PURPOSE

To provide the participant with proper earthwork inspection techniques and to improve quality control management on construction projects.

DESCRIPTION

Covers, through lecture and conference sessions, the field of soils identification, soil sampling and testing, and techniques for earthwork inspection and testing.

ELECTRICAL INSPECTION (COE)

Course Length: 40 Hours

PURPOSE

To provide the participant with the requirements and techniques of electrical inspection in order to assure compliance with contract requirements. To provide the participant with increased knowledge of materials, equipment, installation, and inspection techniques. This course will further provide training in interpretation of plans and specifications and the National Electric Code.

DESCRIPTION

Presents, through lectures and directed conference sessions, methods of inspection for interior and exterior distribution, controls, lighting, special alarm and communications systems, and other electrical installations. Places emphasis on enforcement of contract requirements, compliance with electrical safety, electrical code and the contractor's obligation for self-inspection under the quality management program.

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ENGINEERING GEOLOGY 1 (COE)

Course Length: 300 Hours

PURPOSE

This course is designed to update and broaden the technical base of Corps journeyman and supervisory geologists in the area of engineering geology, geophysics, and rock mechanics.

DESCRIPTION

This course will include formal presentation and organized discussions on:

a. Rock properties and behavior.

- (1) Rock properties and behavior.
- (2) Failure criteria of rock masses.
- (3) Statics and equilibrium concepts.
- (4) Physical and mechanical properties of soils.
- (5) Unified soil classification system.
- (6) Consolidation and soil strength theory.

b. Geophysics

- (1) Seismic refractions and electrical resistivity surveys.
- (2) Dams and cross-hole logging.

c. Groundwater Geology:

- (1) Theory of groundwater flow.
- (2) Seepage flow and infiltration.
- (3) Well hydraulics.
- (4) Well design and installation.

d. Seismology:

- (1) Earthquake engineering.
- (2) Seismicity and earthquake engineering.

e. Construction Application of Geology:

- (1) Rock slope stability and design analyses.
- (2) Underground excavation and support methods.
- (3) Grouting and foundation stabilization.

f. Others: remote sensing technology for terrain analysis.

ENGINEERING SEISMOCLOGY (COE)

Course Length: 32 Hours

PURPOSE

This course provides foundations personnel with the capability of evaluating earthquake hazards for engineering design. Geologic-seismologic factors are examined up to and including the specification of earthquake ground motions at engineering sites.

DESCRIPTION

Lecture and demonstration topics include:

- a. Causes of earthquakes.
- b. Scales for earthquakes.
- c. The historic record.
- d. Assessment of faults.
- e. Microearthquakes.
- f. Induced seismicity at reservoirs.
- g. Tsunamis, seiches, and landslide-induced water waves.
- h. Geological and seismological factors affecting earthquake ground motions.
- i. Earthquake recurrence.
- j. Specification of earthquake ground motions.

FINITE ELEMENT ANALYSIS OF STRUCTURES (COE)

Course Length: 72 Hours

PURPOSE

This Course will provide the student with an understanding of the finite element method of analysis and to train the student in its use. Applications will be oriented to structural engineering.

DESCRIPTION

- a. Review of matrix algebra.
- b. Matrix structural analysis -- trusses, beams, and frames.
- c. Review of theory of elasticity.
- d. Two-dimensional finite element (FEM) -- principles and element derivations.
- e. Two-dimensional finite element program.
- f. Guidance for idealization.
- g. FEM pre- and post-processor interactive graphics program.
- h. Interpretation of results.
- i. Introduction to general purpose computer codes.
- j. Practical applications of the FEM analysis.
- k. Introduction to nonlinear and soil-structure interaction analysis.
- l. FEM in earthquake analysis.
- m. Workshops on all programs covered in the course.

FLOOD FREQUENCY ANALYSIS (COE)

Course Length: 36 Hours

PURPOSE

This course will provide a basic understanding for the correct application of the Water Resources Council guidelines on flood flow frequencies. The flood Frequency Analysis Computer Program is used throughout the course.

DESCRIPTION

This course is designed to enable the participant to make technically sound discharge-frequency estimates in an efficient manner. The course will focus on the theoretical basis for frequency analysis; application of techniques contained in the "Guidelines for Determining Flood Flow Frequency," published by the Water Resources Council; and application for engineers, hydrologists, and others involved in developing discharge-frequency estimates at gaged locations.

FLOOD PLAIN HYDROLOGY AND HYDRAULICS (COE)

Course Length: 76 Hours

PURPOSE

To provide the participants with a knowledge of hydrology engineering techniques used by the Corps of Engineers in Flood Plain Studies

DESCRIPTION

The course covers basic hydrologic engineering techniques for applications in flood plain management studies. Topics will include frequency analysis concepts; basin rainfall and loss analysis; the Clark, SCS, and Snyder unit hydrograph techniques; kinematic wave techniques; hydrologic techniques for flood routing; hypothetical storm concepts; urban runoff considerations; and water surface profile computations. A major emphasis of the course will be placed on application of computer program HEC-1 for calculating discharge hydrographs and computer program HEC-2 for calculating water surface profiles. Lectures and workshop sessions will provide the participant with the background required to apply these programs and evaluate program output.

FOUNDATIONS OF EXPENSIVE CLAY SOILS (COE)

Course Length: 38 Hours

PURPOSE

This course is designed to provide advanced level, intensified instruction on the design and construction of foundations on expansive soils. The objective is to develop the technical proficiency of the Corps geotechnical engineers for analysis and design of foundations on expansive soils and to advance their knowledge to the current state-of-the-art. The course is initially intended to implement the new technical manner.

DESCRIPTION

The program consists of comprehensive lectures and laboratory sessions providing indepth instruction on analysis, design, and construction of foundations on expansive clay soils. Sessions will include recognition of problem expansive soils, field exploration technique, laboratory investigations and methodology for prediction of soil volume changes, design of reinforced light and heavy mats and drilled shaft foundations, and techniques for stabilizing expansive foundation soils. Foundation construction methodology as well as remedial measures will be included. Examinations will be given periodically.

GROUND WATER HYDROLOGY (COE)

Course Length: 36 Hours

PURPOSE

The course will provide concepts, procedures, and techniques employed in the analysis and investigation of ground water problems.

DESCRIPTION

The course will focus on concepts of applied ground water hydrology for the purpose of planning and evaluation. Emphasis on problem solving capabilities and techniques will be made. Hydrologic, environmental, and economic considerations will be presented within the framework of applied ground water hydrology. Hand methods and computer techniques will be presented as methods of analysis.

GROUTING & FOUNDATION TREATMENT (COE)

Course Length: 24 Hours

PURPOSE

The course provides engineers, geologists, and field inspection personnel with the latest CE and industry methodology to plan, implement, and evaluate grouting projects to enhance understanding of methods, mechanics, and products available; and to evaluate requirements and adequacies of various aspects of these fields.

DESCRIPTION

- a. Grout mixture materials.
 - b. Special grouts.
 - c. Grouting equipment and accessories.
 - d. Grout mixture proportioning and testing.
 - e. Batching, mixing, and testing.
 - f. Chemical and epoxy grouts.
 - g. Slab jacking and stabilization.
 - h. Expansive cements and grouts.
 - i. Grouting methods.
-

HYDRAULIC DESIGN OF FLOOD CONTROL CHANNELS (COE)

Course Length: 36 Hours

PURPOSE

This course will familiarize design engineers with the last criteria and general guidance for design of flood control channels.

DESCRIPTION

The course will cover design of various types of flood control channels to include both natural and high velocity channels, riprap design, flow through bridges, sediment control, open channel junctions, transitions and controls, and hydraulic model studies. Lectures, discussions, and workshops including the use of available computer programs will be used.

HYDRAULIC DESIGN OF LOCKS AND DAMS (COE)

Course Length: 36 Hours

PURPOSE

To familiarize hydraulic design engineers with latest criteria and general guidance for design of navigation locks and dams.

DESCRIPTION

The course will cover design of various types of lock filling and emptying systems including intakes, culverts, valves, and distribution systems in the lock chamber and outlets. Surges in a canal created by filling and emptying of a lock will be discussed. Site selection and lock approaches will be included. The design of low-head navigation dams will include the spillway, crest piers, control gates, stilling basins and riprap protection.

HYDRAULIC DESIGN OF SPILLWAYS AND OUTLET WORKS (COE)

Course Length: 36 Hours

PURPOSE

To acquaint Corps hydraulic with the existing published guidance and present guidance developed and awaiting publication; to discuss guidance under development covering the hydraulic design of spillways and outlet works. Design problems and areas needing research will also be discussed. Upon completion, the student should be able to use the latest approved design guidance of the Corps.

DESCRIPTION

- a. Introduction and purpose
- b. Planning requirements and procedures
- c. Spillway design and model studies
- d. Outlet works design and model studies
- e. Discussion of design problems

HYDRAULIC SURVEY TECHNIQUES (COE)

Course Length:

1. Classroom: 40 Hours; Location: WES - Vicksburg, MS
2. Application: 40 Hours; Location: District Offices*

PURPOSE

This course will provide participants with basic knowledge and technology to insure effective use of modern electronic hydrographic survey equipment.

DESCRIPTION

- | | |
|-------------------------------|------------------------|
| 1. Classroom: | 2. Application: |
| a. Hydrography | a. Shore station setup |
| b. Radio aids | b. Calibration |
| c. Automated data acquisition | c. Equipment operation |
| d. Field problems | d. Field survey |
-

HYDROLOGIC ANALYSIS OF FLOODS (COE)

Course Length: 76 Hours

PURPOSE

To provide participants with an understanding of the rainfall-runoff process and the application of the HEC-1 computer program for simulation and analysis of flood events in river basins as well as urban areas.

DESCRIPTION

The primary focus of the course will be on the application of the HEC-1 computer program. The theory of watershed rainfall-runoff process will be presented and then simulated with the HEC-1 model. Topics to be discussed include basin-average rainfall and infiltration/interception, unit hydrograph and kinematic wave land surface runoff, and flood routing. Application of the program to complex river basins, urban areas and ungaged areas will be learned. HEC-1's hydrologic analysis features for optimization of unit hydrograph and loss rate parameters, calibration to flood event and flood frequency, multiflood simulation, and multiproject simulation will be applied.

The use of continuous hydrologic simulation models will be described. Their use in flood studies will be contrasted with the single-event HEC-1 approach.

HYDROLOGIC ENGINEERING FOR PLANNING (COE)

Course Length: 36 Hours

PURPOSE

This course is intended to provide an understanding of basic hydrology and hydraulic concepts and their application in water resource planning.

DESCRIPTION

The course will provide participants with a conceptual understanding of hydrograph analysis, fluvial hydraulics, frequency analysis, reservoir studies, management of hydrologic studies and interface H&H input to impact analysis. The course is intended for professionals engaged in planning who have a limited background in the basic principles and theory of hydrology and their application in planning studies.

ICE ENGINEERING (COE)

Course Length: 24 Hours

PURPOSE

Presented guidelines and design criteria to engineers responsible for planning, designing, and operating of hydraulic structures in ice prone waterways.

DESCRIPTION

The course will cover properties of ice, ice forces of structures, design of ice control structures, ice suppression methods, ice jam mechanics, ice caused shore erosion, ice caused property damage, remote sensing of ice, ice project planning, and ice jam removal.

INSPECTION AND EVALUATION OF SAFETY OF NON-FEDERAL DAMS (COE)

Course Length: 36 Hours

PURPOSE

To provide an introduction to the engineering principles and practices involved in inspecting existing dams and assessing their safety.

DESCRIPTION

The level of instruction and curriculum content is appropriate to students who are graduate engineers but have no previous experience in the engineering of dams. The instruction is designed to develop understanding of the more elementary techniques in each technical area of engineering or geology that is applicable to the inspection and assessment of dams. The technical areas covered are hydrology, hydraulics, geology, soil mechanics, structural engineering, and electrical and mechanical engineering. In addition, guidance on documentation of inspections and evaluations is covered.

NUMERICAL MODELING FOR ENGINEERING (COE)

Course Length: 40 Hours

PURPOSE

This course will familiarize engineers and planning with techniques of numerical modeling applicable to water resource studies.

DESCRIPTION

The course is designed to introduce project manager, engineering supervisors, and planners and engineers at all levels to various applications of proven numerical models. To achieve its objective, the course features selected operational models and typical case studies of general interest to the Corps of Engineers. Following a day on basic concepts and fundamentals, highly qualified instructors from both within and outside the Corps present their experiences in the practical aspects of numerical modeling and simulation. Application of numerical models to the following areas are included in the course curriculum:

- a. River forecasting
- b. Dam failures (hydraulic aspects)
- c. Sediment transport (in rivers and estuaries)
- d. Water quality modeling
- e. Water resource planning and systems analysis
- f. Coastal engineering
- g. Waste water treatment
- h. Water supply and facility planning

PROBABILISTIC METHODS IN SOILS MECHANICS (COE)

Course Length: 40 Hours

PURPOSE

To acquaint the participants with the theory, elements, techniques of probability that are beginning to be applied in geotechnical engineering.

DESCRIPTION

Covers statistical methods of analysis of soil engineering parameters, the probabilistic approach to safety factors and the application of the statistical decision theory to geotechnical engineering.

REMOTE SENSING - FUNDAMENTALS (COE)

Course Length: 40 Hours

PURPOSE

This is a lecture-lab demonstration course designed to provide an understanding of the fundamentals of remote sensing technology as it is applied to environmental phenomena. The course will stress the basics of remote sensing, including information about the nature of light and optics, the classical properties of electromagnetic waves and their interaction with matter, and a review radiation heat transfer. The working principles of primary remote sensors will be discussed and will include an overview of sensors and sensor platforms. An introduction to weather and earth resources satellites will be included. Photogrammetry will not be included in this course.

DESCRIPTION

The course will be broken down into three parts:

The first part will deal with energy and matter relationships: a. Concepts of force fields; b. geometrical optics; c. properties of electromagnetic waves; d. review of black body radiation laws; and, e. energy-matter interaction and atmospheric interaction.

The second with the technical aspects of the primary sensors in operation: Electro-optical system (non-photographic) a. Radar imagers; b. passive microwave imagers; c. infrared, visible. and ultraviolet imagers; d. thermal scanners; and, e. sonar.

And the third with the demonstration of data processing techniques, image interpretation, and techniques for optically enhancing, enlarging, and clarifying imagery. Demonstration of remote sensing applications a. land use, forestry, geography, geology, hydrology, meteorology, oceanography, etc; b. general discussion of COE problem areas with participants; and, c. data bases.

RESERVOIR SYSTEM ANALYSIS (COE)

Course Length: 76 Hours

PURPOSE

A primary objective of the course is to provide participants with a capability to make reservoir system studies using computer simulation to analyze reservoir system performance.

DESCRIPTION

Reservoir simulation for flood control, water supply, hydropower and multipurpose operation will be covered. Computer program HEC-5 will be the principal tool for reservoir simulation problems. In addition to reservoir simulation by computer, the course will cover topics related to developing flow data and system demands, formulating and evaluating alternative systems, and flood damage calculations.

SEDIMENT TRANSPORT IN RIVERS AND RESERVOIRS (COE)

Course Length: 76 Hours

PURPOSE

This course will review the principals of hydraulics and introduce topics of land surface erosion, channel aggradation and degradation, sediment transport, and use of mathematical models to predict stream bed behavior.

DESCRIPTION

The course is intended to prepare engineers to perform moveable boundary hydraulic studies using the computer program HEC-6 "Scour and Deposition in Rivers and Reservoirs". Topics to be discussed include: Sediment characteristics and data gathering, sediment transport theories and equations for channels and land surfaces, stream bed armoring, and use and calibration of HEC-6 for prediction of stream bed profile changes, reservoir deposition and maintenance dredging. The applicability, data needs, cost, time and reliability of various techniques for calculating rates of sediment movement, scour, deposition, etc., will also be discussed.

SEEPAGE ANALYSIS & CONTROL FOR DAMS (COE)

Course Length: 36 Hours

PURPOSE

This course is designed to train Corps earth and rockfill dam and levee designers in modern methods of seepage analysis and control and in use of new criteria planned for revision to EM 1110-2-1901.

DESCRIPTION

- a. Permeability of soils.
 - b. Techniques of seepage analysis.
 - c. Filter criteria.
 - d. Seepage control methods.
 - e. Foundation treatment.
 - f. Construction problems.
-

SOILS MECHANICS (COE)

Course Length: 320 Hours

PURPOSE

This course is designed to provide graduate level, intensive instruction in soil mechanics and foundation engineering. The objective is to advance the technical proficiency of the Corps geotechnical engineers and to maintain their knowledge current with the state-of-the-art.

DESCRIPTION

The program consists of lectures and laboratory sessions dealing with the theory and practice of soil mechanics, including permeability, compaction, consolidation, shear strength, stress distribution, settlement analysis, bearing capacity, lateral pressures, design of slopes, seepage, earth dam design, soil stabilization, and dynamic loading problems. Examinations will be given periodically.

SOIL-STRUCTURE INTERACTION PROGRAM-WORKSHOP (COE)

Course Length: 40 Hours

PURPOSE

This course will provide the Corps civil engineers with training in the use of soil structure interaction analyses for shallow and deep foundations, sheet pile walls, and reinforced concrete structures.

DESCRIPTION

The course will cover the fundamentals to soil-structure interaction (SSI) analyses and their application to Corps-type problems. Finite difference and finite element computer programs available for the soil-structure interaction analysis will be explained. Both 1-D and 2-D problems will be covered. Examples of Corps-type problems that can be solved using SSI techniques will be included. Workshop sessions will provide the participants an opportunity to use the programs.

SPECIFICATION WRITING FOR CONSTRUCTION CONTRACTS (COE)

Course Length: 40 Hours

PURPOSE

This course provides instruction in the preparation of effective specifications for construction projects. The course is designed for personnel who have had little or no experience in the use of Corps of Engineers guide specifications or in the writing of project specifications for work not covered by guide specifications. The course covers basic principles of specification writing, procedures, and techniques for writing specifications, and relationships of specifications to other elements within the construction system.

DESCRIPTION

Major subject matter topics include:

- a. Language of specifications/written communication
- b. Organization and format of specification
- c. Sources of technical information
- d. Procedures and techniques
- e. Guide specifications and project developed specifications
- f. Relationship to other documents
- g. Cost engineering considerations
- h. Regulatory considerations

STATISTICAL METHODS IN HYDROLOGY (COE)

Course Length: 76 Hours

PURPOSE

Participants will understand the theory of frequency analysis, regression analysis, and regional correlation analysis. The Water Resource Council guidelines on Flood Flow Frequencies will serve as a focal point for development of frequency curves.

DESCRIPTION

Topics to be covered include:

- a. Theory and application of frequency analysis
- b. Graphical and analytical frequency curve development
- c. Application of the techniques in the "Guidelines for Determining Flood Flow Frequencies"
- d. Application of computer program Flood Flow Frequency Analysis
- e. Study of theory and practical application of regression and regional correlation analysis
- f. Fundamental concepts of stochastic hydrology

STRUCTURAL DESIGN AND ANALYSIS SYSTEM (STRUDL)/ADVANCED APPLICATIONS (COE)

Course Length: 40 Hours

PURPOSE

The course will provide advanced training in the use of the general purpose structural design and analyzed system called STRUDL II for solving complex problems using the finite element method. Volumes 1 and 2 of the STRUDL manual will be covered.

DESCRIPTION

- a. Modeling structures for computer solutions--Review.
- b. STRUDL II problem-oriented language convention--Review.
- c. STRUDL II system command--Review.
- d. Complex truss, beam, and frame problems.
- e. Advanced data management uses of STRUDL II.
- f. Finite element types and STRUDL II.
- g. Solution of 3-D problems.
- h. Reinforced concrete design problem.
- i. Evaluation of problem results.

STRUCTURAL DESIGN AND ANALYSIS SYSTEM (STRU DL)/BASIC APPLICATIONS (COE)

Course Length: 40 Hours

PURPOSE

The course will provide training in the use of the general purpose structural design and analysis system called STRU DL II.

DESCRIPTION

- a. Modeling structures for computer solutions.
 - b. STRU DL II problem oriented language convention.
 - c. STRU DL II system command.
 - d. Simple truss and frame problems.
 - e. Data management uses of STRU DL II.
 - f. Advanced frame analysis problem.
 - g. Steel design problem.
 - h. Introduction to finite element analysis by STRU DL.
 - i. Solving practical problems with multiple element types.
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UNSTEADY FLOW ANALYSIS (COE)

Course Length: 76 Hours

PURPOSE

This course will focus on the theory of gradually varied unsteady open channel flow and use of one- and two-dimensional mathematical models to analyze complex hydraulic and hydrodynamic problems.

DESCRIPTION

Primary coverage will be on one-dimensional hydraulics. This will cover the theory, applicability, limitations, and data requirements of unsteady flow models. Guidance in selection of appropriate routing technique for a range of problems such as routing rainfall floods, simulation of dam break flood wave movement, and analysis of flow reversal situations will be presented. Case studies and computer workshops will be used to illustrate model usage.

The theory, status, and applicability of mathematical models for calculating two-dimensional flow fields will be discussed. Application of such models will be demonstrated through case studies.

WATER SURFACE PROFILE COMPUTATION USING HEC-2 (ADVANCED) (COE)

Course Length: 36 Hours

PURPOSE

This is an advanced course in the application of computer program HEC-2. The course is intended to provide participants with the knowledge to effectively use computer program HEC-2 to analyze difficult conditions in natural and man-made channels.

DESCRIPTION

Topics will include applications and limitations of one-dimensional models, effective use of HEC-2 bridge analysis techniques, super critical flow, efficient determination of floodways, use of the CHIMP option to analyze improved channels, divided flow analysis, the determination of Manning's n, and flow under ice cover.

WATER SURFACE PROFILE COMPUTATION USING HEC-2 (BASIC) (COE)

Course Length: 40 Hours

PURPOSE

To teach the student the concepts of open channel flow, data requirements, HEC-2 input requirements, application of bridge routines, channel improvement analysis, floodway determination, and output analysis.

DESCRIPTION

The course will focus on application of computer program HEC-2 to compute steady-flow water surface profiles. Topics will include concepts of open channel flow, data requirements, basic input requirements, output analysis, application of bridge routines, use of the channel improvement option, and floodway determination. Participants will have an opportunity to prepare input and analyze output during workshops.

WELDING INSPECTION (COE)

Course Length: 40 Hours

PURPOSE

To relate to the participant the various methods and techniques employed in the inspection of weldments and to read the results of nondestructive examinations.

DESCRIPTION

Covers, through lecture, conference, and practical exercise sessions, the subjects of welding safety and precautions, welding symbols, processing and inspection problems, roof decking welding and inspection, codes, procedures, and operation qualification, filler metals, workmanship, visual inspection, dye penetrant, magnetic particles, radiographic and ultrasonic testing techniques and interpretation, and destructive testing.

DAM SAFETY TRAINING PROGRAM FOR OPERATIONS AND MAINTENANCE PERSONNEL (TVA)

Course Length: 16 Hours

PURPOSE

This course is intended to provide training for operations and maintenance personnel in the identification of significant or potential structural problems affecting dam safety, and for familiarization with inspection and reporting procedures for both routine and emergency conditions.

DESCRIPTION

This course is in two sessions.

Session I consists primarily of classroom lectures by specialized personnel, giving an overview of the design, construction, and operation of TVA dams. Emphasis is placed on the importance that maintenance and operational personnel play in TVA's dam safety program.

Session II is site specific training. This session is especially important in training operating personnel to be thoroughly knowledgeable on all pertinent project features affecting dam safety. Both sessions are conducted by operations and design personnel.

BASIC AERIAL PHOTO INTERPRETATION (R-3) (ALBUQUERQUE, NM) (FS)

Course Length: 40 Hours

PURPOSE

To teach student to become knowledgeable in the use and practical application of aerial photography in Forest resource management.

DESCRIPTION

By means of lecture and lab work, student will be exposed to variety of photogrammetric aids and techniques for using aerial photographs to accomplish resource management work on National Forests.

DAMS WORKSHOP (R-6) (PORTLAND, OR) (FS)

Course Length: 2 Days

PURPOSE

Update dam inspection personnel.

DESCRIPTION

Provide information on new manual, inventory updates, operation and maintenance, inspection, flood routing, and emergency preparedness plans.

ELEMENTARY SLOPE STABILITY (R-2) (LAKEWOOD, CO) (FS)

Course Length: 32 Hours

PURPOSE

This course is intended to provide basic training in cut and fill slope stability for routine road design applications. Major cuts (say those deeper than about 25 feet) are not included nor is the investigation of large landslides.

DESCRIPTION

The solutions taught are based on visual recognition of soil parameters, and a few extremely simple qualitative tests. The user then refers to various stability number charts to derive either the safe slope angle or the soil strength at the time of the failure.

Programs for the HP-41 calculator are reviewed briefly and a very short discussion of rock slope stability is included for introductory purposes.

GEOTECHNICAL WORKSHOP (R-5) (SAN FRANCISCO, CA) (FS)

Course Length: 32 Hours

PURPOSE

For geotechnical specialists to keep abreast of latest developments in the geotechnical field within FS and by others.

DESCRIPTION

Through presentations and discussion by all participants, the workshop provides a forum for specialists to keep current in the technical field and to obtain input on specific projects from other specialists.

INSPECTOR WORKSHOP (R-3) (ALBUQUERQUE, NM) (FS)

Course Length: 40 Hours

PURPOSE

To improve technical inspection and administration skills of construction inspectors.

DESCRIPTION

Review of types of contracts, line of authorities, primary duties of inspectors, and documentation needed to administer a contract.

MATERIAL SAMPLING AND TESTING (R-4) (OGDEN, UT) (FS)

Course Length: 40 Hours

PURPOSE

Train Road Contract Inspectors to perform proper sampling and testing.

DESCRIPTION

Upon completion, participants will be able to understand and perform the required sampling and testing for road construction inspection.

NUCLEAR MOISTURE-DENSITY GAUGE OPERATION (R-5) (SAN FRANCISCO, CA) (FS)

Course Length: 16 Hours

PURPOSE

To train individuals in the proper use of nuclear moisture-density gauges.

DESCRIPTION

Through lecture, demonstration, and "hands-on" use, individuals are trained in the use (including calibration and interpretation of results), storage, and transporting of nuclear gauges in accordance with FS, USDA, and NRC regulations and policies.

ROCK BLASTER EXAMINER AND USER QUALIFICATION (R-6) (PORTLAND, OR) (FS)

Course Length: 32 Hours

PURPOSE

Certify Forest users of explosives in rock blasting.

DESCRIPTION

Train personnel in proper handling, transporting, and use of explosives.

VALUE ANALYSIS (R-6) (PORTLAND, OR) (FS)

Course Length: 40 Hours

PURPOSE

Provide training on conducting value analysis on projects or processes. Value analysis is an organized effort directed at analyzing the functions of an item or system for the purpose of achieving the required function at optimum total cost of ownership constant with requirements for performance, reliability, quality, and maintainability.

DESCRIPTION

A formal "hands-on" 40-hour training session designed for people who will be conducting analyses.

VALUE ENGINEERING/VALUE ANALYSIS (R-3) (ALBUQUERQUE, NM) (FS)

Course Length: 40 Hours

PURPOSE

To teach the student the principles and techniques of performing Value Analysis reviews on engineered projects.

DESCRIPTION

This course will teach the student to select appropriate projects for analysis, will provide "hands-on" experience by analyzing actual projects, and will teach the student to prepare effective presentations of results.

CONTRACT ADMINISTRATION - CONSTRUCTION CONTRACTS (SCS)

Course Length: 40 Hours

PURPOSE

This course is designed to provide the student with a general knowledge of the overall program of contract administration.

DESCRIPTION

The course is designed to inform participants of the established administrative and technical procedures and contract requirements for construction, and the interrelated duties and authorities of the various parties. Subjects covered are: technical responsibilities; administrative responsibilities; kinds of contracts; cooperating organizations; contract documents; showing jobsites; awarding contracts; requirements of the contract; supervision of subordinates; inspection and acceptance; and reports. Upon completion of the course, the participant will be able to:

- a. Interpret drawings and specifications.
- b. Describe when the terms of contracts and other documents are not being met and what action is necessary to achieve compliance.
- c. Perform all inspections related to final acceptance of installation. Prepare the necessary reports along with required documentation.
- d. List and explain what rights and responsibilities are provided to the cooperating local agency and the Soil Conservation Service under the terms of the project of the project agreement covering construction work.

CONTRACT ADMINISTRATION - PROFESSIONAL SERVICES CONTRACTS (SCS)

Course Length: 40 Hours

PURPOSE

This course is designed to provide participants with an understanding and the applicability of the provisions of law, regulations, policies, and procedures governing the contracting for professional services.

DESCRIPTION

The course covers both negotiated and advertised SCS contracts. It includes instruction on invitations for bids and requests for proposals; advertising for bids and proposals; receiving and evaluating bids and proposals; awarding contracts; administering contracts; terminating contracts. It covers procedures to be used in negotiating contracts. The course will emphasize the role of both the professional and administrative member. It does not include instruction on administering construction contracts which is covered by the course now titled, CONSTRUCTION ADMINISTRATION - CONSTRUCTION CONTRACTS. Upon completion, the participant will be able to :

- a. Distinguish and recognize conditions which determine whether the task to be performed should result in a contract with Architect-Engineering Firms or firms providing the other professional services.
- b. Participate in and/or develop cost estimates, performance time and specifications.
- c. Be a member of the Board of Contract Awards/Technical Evaluation Board to evaluate and select firms qualified to perform the required work.

ENGINEERING - CONCRETE (SCS)

Course Length: 40 Hours

PURPOSE

This course is designed to instruct the trainee in the materials, manufacture, and installation of quality concrete.

DESCRIPTION

This course covers the types of cement; selections of aggregates and water; air entrainment; admixtures; design of mixes; sampling and testing; placing, finishing, and curing; steel reinforcement; and forming. Upon completion, the participant will be able to:

- a. Select aggregates and other materials including admixtures.
 - b. Design concrete mixes to attain desired strengths as presented in SCS manuals and by Portland Cement Association.
 - c. Sample concrete mixes and perform slump tests and make concrete cylinders for laboratory testing.
 - d. Inspect the placement of concrete and steel reinforcement and check on finishing and curing.
-

ENGINEERING - CONSTRUCTION INSPECTION (SCS)

Course Length: 80 Hours

PURPOSE

This course is to provide the construction inspector with the knowledge of "what to do" and "how to do it" during the construction of various types of structures.

DESCRIPTION

This course is designed primarily for the construction inspector. It includes; engineering surveys; earthwork; reinforced and plain concrete; forms and forming; rockwork; how to take samples and make field tests; how to interpret drawings and specifications; and documentation of information pertinent to construction. The content covers the "inspector's job" including what to do and how to do it. It includes earthen structures, concrete, steel, and rock. Upon completion of the course, the participant will be able to:

- a. Evaluate surveys, test compaction, sample concrete, and calculate volumes.
- b. Interpret drawings and specifications and test results in terms of the project being constructed.
- c. Maintain records to document information pertinent to construction completion.
- d. Interpret contract provisions in relation to construction inspection.

ENGINEERING - HYDROLOGY - LEVEL III (SCS)

Course Length: 40 Hours

PURPOSE

This course will teach the participant to use Soil Conservation Service hydrologic criteria and procedures to correctly design soil and water conservation measures.

DESCRIPTION

Emphasis is placed on hydrologic procedures and concepts used in the design of soil and water conservation practices with emphasis on earth dams, determining peak rates of runoff, and the effect of urbanization on the peak and volume of runoff. Upon completion of the course, the participant, with limited supervision, will be able to:

- a. Interpret and apply hydrologic criteria and procedures in the design and installation of soil and water conservation practices.
 - b. Use hydrologic criteria and procedures in the design and installation of soil and water conservation practices.
 - c. Use and understand computer programs as a hydrologic design tool.
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ENGINEERING - STRUCTURAL DESIGN (LEVEL II) (SCS)

Course Length: 80 Hours (plus night work)

PURPOSE

This course provides orientation training in the application of structural design analysis to Soil Conservation Service structures.

DESCRIPTION

Topics will include rigid body mechanics; material properties; moment, shear, flexure, deflection, and combined stresses; loading (live, dead, and dynamic); reinforced concrete design principles and procedures; working drawings and steel placement details; design procedures and assumptions involved in standard designs of drop inlet spillways, overflow drop spillways, and chutes. Upon completion of the course, the participant will be able to:

- a. Apply structural design methods to the design of common structures used in SCS work.
- b. Use SCS standard detail structural drawings at locations within the design purpose and scope.
- c. Use SCS design handbooks and working tools to develop the more common hydraulic structure designs meeting the established standards and site needs with proper regard to the criteria.

SAFETY EVALUATION OF EXISTING DAMS (BR)

Course Length: 32 Hours

PURPOSE

To teach attendees the causes and modes of dam failures and near-failures and to identify engineering and geological considerations which should be considered in dam safety inspections and evaluations.

DESCRIPTION

Inspection and evaluation considerations and techniques are presented in modular form. Topics covered are inspection program concepts, analysis concepts, dam incidents and failures, instrumentation, hydrology, sedimentation and channel degradation, foundations and abutments, reservoir area, geology and seismicity, landslide generated waterwaves, earthquake loading evaluation, earth dams, concrete dams, appurtenances, mechanical equipment, emergency preparedness, dam failure inundation studies, and case histories, an onsite inspection of one or two dams is generally included.

CONSTRUCTION INSPECTION OF DAMS AND COAL REFUSE EMBANKMENTS (MSHA)

Course Length: 24 Hours

PURPOSE

To provide attendees design, construction, and inspection techniques for coal refuse embankments and impoundments.

DESCRIPTION

This is intended as an educational program for coal industry personnel involved in the design, construction, and inspection of coal refuse embankments and impoundments. However, other participants are also welcome to attend. Topics include site investigation, subsurface exploration, sampling and logging of soil, rock coring and pressure testing, foundation preparation, embankment installations, culverts and decants, filters and drains, piezometers and observation wells, plastic and corrugated metal pipes, density and moisture testing, standard proctor, sand-cone and nuclear density gage, moisture determination, and compaction specifications.

DESIGN GUIDELINES FOR IMPOUNDMENTS (MSHA)

Course Length: 24 Hours

PURPOSE

To provide the attendees with design criteria and other considerations which should be used in designing coal refuse piles and impoundments.

DESCRIPTION

This seminar emphasizes the recommended criteria established by MSHA for coal refuse piles and impoundments and is offered primarily for MSHA personnel responsible for the review and inspection of coal, metal, and non-metal refuse disposal facilities. However, other participants are also welcome to attend. Topics covered in the seminar are laboratory test data, slope stability, seepage control, disposal techniques, settlement and subsidence, design storms, spillways, site grading and diversion ditches, conduits within embankments, and erosion control.

ADVANCED GEOLOGICAL REMOTE SENSING TECHNIQUES (USGS)

Course Length: 40 Hours

PURPOSE

To expose practicing geoscientists to the concept and utility of geological data bases.

DESCRIPTION

This course introduces practicing geoscientists to the concept and utility of geological data bases that incorporate topographic, geographic, geophysical, geochemical geological, and remotely sensed data types. Participation is intended by geoscientists who are actively involved in mineral resource investigation. A working knowledge of geologic concepts and principles is assumed. Previous experience in the analysis and interpretation of geophysical data or geochemical data or remotely sensed data is required. A knowledge of computer processing techniques applied to geologic investigations is desirable. Subjects covered are a review of fundamentals (geo-base data types, analytic techniques, interpretive techniques, and correlation techniques), data-base planning, data-base implementation, interactive analysis, and data-base management.

DAM-BREAK MODEL SYMPOSIUM WORKSHOP (NWS)

Course Length: 32 Hours

PURPOSE

To provide the participant with information on the Dam-Break Model developed by Dr. Danny Fread and encourages discussion by participants on their experience in using this model.

DESCRIPTION

This symposium is aimed at updating the hydrologic community on the Dam-Break Model, providing detailed information on the models, presenting the handheld computer version of the Dam-Break Model, and providing a forum for users of the models to present and share their modeling experiences.

DESIGN OF SMALL EARTH DAMS (BLM) (Bureau of Land Management)

Course Length: 40 Hours

PURPOSE

To enable the participant to compute the inflow hydrology of a reservoir site, determine the size of dam required, design the dam structure and outlet works, and develop inflow and outflow hydrographs.

DESCRIPTION

Background information concerning the design of dams will be presented, such as hydrology, geology, topography, materials, and construction practices; as well as inspection during construction and for maintenance. This will be presented in a classroom setting, with examples and problems.

SMALL EARTH DAM CONSTRUCTION INSPECTION (BLM)
(Bureau of Land management)

Course Length: 20 Hours

PURPOSE

To enable the participant to perform measurements and calculations for earthwork, inspect construction of embankments and outlet works, and to perform the necessary field tests.

DESCRIPTION

This course will cover construction methods and equipment, types of field tests, and inspection of foundations, earthwork, culvert pipe, and concrete.

This is a classroom course, with examples. (Students will be tested.)

